

Transition toward systems linking animal genetic resources, low input farming systems and products processed on the farm; development logics of the Bretonne Pie Noir local cattle breed

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Abstract: The Bretonne Pie Noir cattle breed is a French rare breed that was once threatened with disappearance but whose population has increased over the last 40 years. This turnaround happened because farmers used the breed (i) to conserve domestic biodiversity, but also (ii) by adding value to the breed as the result of individual dynamics and (iii) by including the breed in low input farming systems with a more environmentally friendly goal in Brittany, a region where intensive agriculture was causing environmental problems.

This local breed is thus a good subject to study of the transition to more agro-ecological agriculture. It also raises the question of the role played by the genetic resource - in conjunction with other aspects - in the design of such systems.

Interviews with a wide range of breeders enabled us to identify each breeder's project and the role the breed played in it, management practices, the links between breeders and other stakeholders, and the way the products of the breed are sold. These interviews were completed by interviews with restaurant managers and personal observations in markets to identify the kind of information that was passed on during the sale of products and the place of the breed in the sales argument. Finally we interviewed local civil servants to better understand past and present actions to support such systems. We analyzed our results to explore the notion of diversity and what kind of diversity we are talking about when we talk about agro-ecological livestock systems.

Keywords: local breed, added value, low input farming systems

Introduction

Dumont et al. (2013) pointed out that animal production has not really been taken into account in agro-ecological thinking. Agro-ecology is presented as a way to reduce the environmental footprint of agricultural production but is also considered as a wider approach that accounts for organizational and political dimensions.

Transition towards more agro-ecological systems refers either to a transition at the scale of a farm, i.e., changes in the farming system and/or marketing system) or changes in agro-ecological systems at the scale of a territory, i.e., changes in marketing or in consumption habits, etc.

Among the five principles for the development of agro-ecology based alternatives, referred to by, for instance, Dumont et al. (2013), the same authors explain their view of enhancement of diversity in the farming system as a way to strengthen its resilience. Like Stassart et al. (2012), who underline the importance of agro-biodiversity in the agro-ecological approach, Dumont et al. (2013) mention the use of breeds of animal with different abilities. They also refer to the general abilities of local breeds (greater ability to survive and maintain their level of reproduction in

harsh environments), and the fact that the specificities of the products of the breeds can be a marketing asset.

We used a concrete case study to identify the place of a local breed in the design of low input livestock farming systems (which could nowadays be qualified as more agro-ecological), by linking biological diversity to other aspects of these farming systems (e.g. fewer inputs and less pollution).

In the following section, we describe our method, which is based on a case study involving the Bretonne Pie Noir breed of cattle. We analyze our results with respect to the role of the local breed in the farmers' overall production system. Finally, we discuss the role of the local breed in the design of those systems, with particular emphasis on the place of within-breed diversity and the range of different possible forms of added values in such systems.

Material and methods

The Bretonne Pie Noir: the role of local breeds in the design of low input farming systems

The Bretonne Pie Noir is a rare breed of French cattle that was once threatened with disappearance. It is mainly found in Brittany. It was part of the first conservation program for a local cattle breed in France (Colleau et al., 2002). The population of the breed increased from 311 animals in 1976 to 1554 in 2011 (Bretonne Pie Noir Union activity report 2012). Farmers used the breed (i) to conserve domestic biodiversity but also (ii) to give added value to the breed through individual actions and (iii) used the breed in low input farming systems with a more environmental friendly goal in Brittany, a region where environmental problems linked with intensive agriculture had emerged (Quéméré, 2006).

This local breed is thus a good subject for the study of the transition to more agro-ecological agriculture. More particularly, this case provided an opportunity to examine the role played by the genetic resource -in conjunction with other dimensions- in the design of such systems.

Qualitative analysis based on interviews and observations

We conducted semi-structured interviews with 31 breeders selected to represent a range of situations (several criteria are considered: professional or "amateur" breeders, their geographical location, dairy or meat production). The questions we asked concerned their own trajectory as breeders, their reasons for choosing this breed, the main characteristics of their production system, their genetic management practices, the processing of products and their sales practices. They also concerned collective action focused on the breed and their commitment to the Bretonne Pie Noir breeders association. Whenever possible, the interviews were recorded, otherwise, notes were taken. The transcriptions (or notes in a few cases) were coded and analyzed using NVivo software.

The interviews with breeders were completed by interviews with two restaurant managers and observations in two markets to see what information was passed on during the sale and the place of the breed in the sales arguments.

Finally we interviewed two local civil servants to better understand past and present actions to support such systems.

Results

Entering farming with *Bretonne Pie Noir* but no change in systems within the farm.

All the farmers we interviewed told us they chose Bretonne Pie Noir to start farming or hobby farming; no farmers we interviewed said they had completely changed their system during the lifetime of their farm. Consequently, in our case, the agro-ecological transition is not represented by changes in systems at the scale of the farm, as was the case in the study by Coquil et al. (2012). Neither is the transition the result of a collective and/or territorial approach to a transition to agroecology, which in France is encouraged among others by an administrative status called 'groupings of economic and environmental interest' (Groupements d'intérêt économique et environnemental, GIEE). The phenomenon we report here predated those initiatives: increasing numbers of farmers have been developing low-input farming systems using the Bretonne Pie Noir since the 1970s. Most of the farmers we interviewed designed their system with the desire to reduce inputs, be autonomous, conserve biodiversity, or out of a concern for the environment (they mentioned conserving the species diversity of pastures, the importance of domestic diversity, the fact that a breed should be adapted to the environment and not the reverse, a concern for limiting non-reusable packaging etc.).

We consider that, historically speaking, these systems are part of a current nowadays qualified as agro-ecological, even though none of the farmers actually used this term to describe their system.

We interviewed both professional and hobby breeders. Professional breeders used the breed for either milk production (and sold the dairy products they processed on the farm) or for meat production. Today there are more hobby breeders than professional breeders of Bretonne Pie Noir, but hobby breeders have very small herds (sometimes only one or two cows).

The choice of the *Bretonne Pie Noir* was linked to the choice of the overall production system

Our findings showed that each farmer's choice of the Bretonne Pie Noir was closely linked to the choice of a farming system and a way of producing and selling (and/or consuming) products.

We first analyzed the farmers' reasons for choosing this breed, and how, as a function of the category of breeder, in their discourse, they linked their choice with their overall project

We identified three kinds of explanations for the farmers' choice of the breed:

- Explanations concerning the breed's abilities and behavior: reproductive ability, hardiness, size, low food needs, autonomy, ability to harsh lands conditions.

A female breeder we interviewed mentioned that Bretonne Pie Noir cattle are easy for a woman to handle.

- Explanations concerning the added value of the breed: good quality milk for cheese, the better flavor of the meat, small carcasses that are easier to sell directly:

"The carcass is small, less impressive... you can put it in the freezer yourself. If we can't sell it, we have nearly 200 kg of meat, that's feasible. A Charolais or Blondes d'Aquitain carcass weighs 300-350 kg, that's too much".

- Explanations linked to a vision of conservation: question of heritage, history, or conservation of biodiversity. One breeder we interviewed said:

"I don't know if I would have started if I had not known about Bretonne Pie Noir and if the challenge of saving the breed hadn't tempted me. I can't say. Anyway, that is how I began." Another

wanted to rediscover the cows of his childhood: *“because I was the son of a farmer who raised Bretonne Pie Noir in the North of Finistère, I wanted to recreate what I had known when I was a child”*.

The farmers offered different combinations of the three kinds of explanations. By analyzing these combinations, we identified several different main goals in the design of the systems. In turn, this enabled us to identify five main types of overall projects for breeding Bretonne Pie Noir:

-To earn a good income with a local breed thanks to marketing channels for high value products.

Some professional farmers have a “big” herd of Bretonne Pie Noir, process a relatively large quantity of milk into different kinds of cheese on the farm and sell the cheese directly or in organic food stores, cheese stores, or to restaurants. One breeder sells suckling calves and piglets, produces vacuum-wrapped meat and cooked meals. He sells his products in different organic stores and at the farm gate. Most of these breeders are organic breeders. Their farms are larger than other farms that raise this breed, yet they clearly chose not to practice conventional farming.

-To make a reasonable living by processing a small quantity of milk from a local breed on the farm and by direct sales

A number of professional farmers limited themselves to small scale dairy production and process their own milk on the farm. They sold their products at the market and at the farm gate. Their aim was to make a ‘reasonable living’ on their farm but they were not interested in expanding. They told us they do not have many needs. If they had the opportunity to extend their farm (for instance, because land is available) their preference would be for another farmer to set up. In their view, what is important is maintaining life in rural areas.

-To achieve food self-sufficiency for their family by raising a local breed

These farmers most often focus on dairy production and process their milk on the farm. Some milk their cows only once a day. They produce eggs, meat (calves, pigs, poultry, etc.) for home consumption and for direct sale. They grow vegetables for their own consumption. They want to have time for other activities and to spend time with their family. Some do not consider farming as a job but as a way to feed their family. In their view, jobs, agricultural land, etc. should be shared.

-To produce good meat with a minimum workload in order to have time for other activities

Some of these breeders have several activities (including another farming activity, breeding other species or growing vegetables, or another job, not in agriculture). They consider that meat production is less time consuming than dairy production and that Bretonne Pie Noir is a suitable breed because it is independent, which leaves time for other activities (professional activities or a hobby).

Some of the breeders we interviewed in this category belonged to associations for nature conservation and raised Bretonne Pie Noir to maintain wetlands, marshes, or other natural areas of ecological interest. In these cases, the associations’ technicians do not have much time for livestock activities (it is not their job).

-To maintain the landscape and produce good quality products for home consumption or to sell to relatives and friends

Breeders in this category farm as a hobby or keep just one cow to maintain the landscape. They produce meat that they consume themselves or sell to friends. Some raise other animals: sheep, pigs, poultry, donkeys, etc. They are often interested in the conservation of rare breeds.

Wide range of products or services produced in systems that include *Bretonne Pie Noir*.

Bretonne Pie Noir cattle are used in different production systems in which on-farm processing of the products and direct sales¹⁹⁹ are two key factors. All the professional farmers we interviewed underlined the importance of these two orientations in making a living by breeding *Bretonne Pie Noir*. Only one of the dairy farmers we interviewed sold most of his milk to a milk factory and only a small proportion through direct sales.

To develop direct sales, breeders have to produce a variety of cheeses. One of the breeders insisted that he chose to have a small farm. He believed that having a range of different cheeses is the best way to create customer loyalty and to earn a living from a small farm. In fact, butter is the main traditional milk product in Brittany, which is not a traditional cheese producing region. The range of products varied from one farm to another. Most produced a range of different cheeses using recipes borrowed from other cheese producing regions (cream cheeses, soft cheeses, hard cheeses) and also sold milk and other dairy products (yogurt, fromage frais, cream, butter and *gros-lait*, a local fermented milk).

Some of the breeders focused more on one kind of product than another. For instance, one farmer favored dairy products other than cheese (in particular butter) which she considered to be simpler and more traditional; others favored hard cheese, because they can store it and sell it in the tourist season. Some have added products they consider to be ‘luxury’ or ‘high added-value products’ like *confiture de lait*²⁰⁰ to their range whereas others preferred not to sell products that are too expensive.

Observations were made during sales transactions to identify to what extent the breed was mentioned as a sales argument. We chose two markets where dairy products were sold, each in a different context: the first market was in a small town, in a former outside market, and was quite family oriented, whereas the second was a modern inside market in a bigger town. Discourse during the sale was minimal in the larger market but more important in the small town market. According to our interviews and observations, the link between the breed, the product, and the farming system is important to most of the breeders, but the link between the breed and the product plays almost no role in the marketing process, and is not used as a sales argument.

Nevertheless, the types of interaction during the sales varied and we were able to identify four different types. Two types concerned regular customers: with exchanges about the type and quantity of product desired and its price, as well as exchanges in the family register (the breed was never mentioned), and the other type with exchange in a militant register with questions that were not directly linked with farming activity (the breed was mentioned twice). Another type was the basic minimum exchange, with just a mention of the product desired, the quantity, and the price (the breed was never mentioned). The final type could be described as a ‘discovery exchange’ and the breed was mentioned twice by the farmer and once by the customer. Our observations showed that very little information was exchanged with the customers concerning the farming system or the breed. Moreover, except in the case of the *gros lait* product, which had printed packaging, the information on the products themselves was kept to a minimum. However, in some cases, the breed was highlighted in other ways (a picture on the market stand, a picture on the stand at the farm) and in interviews, the farmers mentioned that they were prepared to explain their farming system and the use of the local breed (some even invited their customers to come to the farm to see the cows). Of course, we only observed two periods of sales, and these involved regular customers who may already be familiar with the products, and in the case of one farmer, the time of the year was not the best period for producing a wide range of cheeses. Consequently, it is dif-

¹⁹⁹ In contrast to the development of local breeds through collective dynamics with ‘Protected Designation of Origin’ products, which has already been widely studied, e.g. Lambert-Derkimba et al., 2010.

²⁰⁰ A jam that is light brown in color and creamy in consistency made from cooked sweetened milk.

difficult to draw conclusions, and we would need to observe sales transactions in different contexts, including with customers who are not regular customers (during the tourist season, for instance).

Other farmers raised Bretonne Pie Noir as part of their meat production systems. They also sold the meat directly, either veal from calves whose age varied with the breeders, or beef. Very few farmers sold cooked (canned) meat. The different products were sold either on the farm, or at markets, through AMAP²⁰¹, in organic food stores, or to restaurants. Most hobby breeders also used the breed for meat production, but their original objective had been to manage a small area of land. In most cases, the meat was kept for home consumption but was also sold to relatives, friends, or other close customers.

The Bretonne Pie Noir breed is also used for landscape and ecosystem management, either by associations or by local authorities or by breeders themselves, through agro-environmental subsidies or through free access to land that has to be managed under specified grazing conditions or for the purpose of tourism (for instance we visited a reconstituted village where former traditional activities are practiced and demonstrated to tourists. The cows milked in the village concerned are local breeds including the Bretonne Pie Noir).

Discussion and conclusion: Diversity in the design of Agro-Ecological Livestock Farming.

The issue of diversity is a core question in agro-ecological thinking. Indeed diversity is considered by many animal scientists to be a key factor in agro-ecological systems (Dumont et al., 2013). The systems designed by the breeders of *Bretonne Pie Noir* provided a good opportunity to ask what kind of diversity we are actually talking about. As mentioned earlier, during the project for the development of the *Bretonne Pie Noir* breed, different production systems that can be considered as agro-ecological systems were developed. In other words, we believe that, since the 1980s, the farmers who raise *Bretonne Pie Noir* have progressively developed low input systems that could be qualified nowadays as agro-ecological systems. Our findings show that diversity plays an important role in these systems and in the farmers' discourses. This makes *Bretonne Pie Noir* a good subject to explore the notion of diversity and what kind of diversity we are talking about when we talk about agro-ecological livestock systems.

In their discourse, farmers referred to different types of diversity: the diversity of genetic resources (agro-bio diversity), of products and of ways to sell products, of customers, and of forms of added value. It appeared that, depending on his/her particular situation, each farmer had created a system that explored one or more kinds of diversity.

- Diversity of genetic resources:

Some of the farmers we interviewed had a clear view of the importance of the diversity of genetic resources. The role played by genetic diversity in the breeders' strategies also varied. The diversity of genetic resources was part of a general concept (with explicitly or non-explicitly associated ideas of heritage, potential for the following generation, and a common good). Farmers mentioned their interest in working with local breeds, or even sometimes pointed to links between the plant genetic resources in their system (for instance linking the taste of their cheese with the genetic diversity of their pastures).

²⁰¹ Associations whose goal is to support small scale agriculture, and who organize regular sales of baskets of farm products to its members.

Some underlined the importance of maintaining diversity in the animal population. Most of the breeders appeared to have assimilated the genetic management plan (a plan for the management of genetic variability, for details, see Colleau et al. 2002) as being the “right thing” to do²⁰². Only a few breeders went into a little more detail about this aspect in their discourse, for instance, mentioning their interest in maintaining rare animals in the population, or raising the question of the best way to maintain diversity within the breed.

Some farmers paid attention to the diversity of the animals in their own herd (for instance keeping cows with a different morphology, some more oriented toward a meat type and other more oriented toward a dairy type). At this level, in their system design, diversity is also a component that adds flexibility to the system.

- The diversity of products and of ways of selling products in response to the diversity of customers

Second, as we mentioned in section 3.3, the different forms of added value to the breed are important for the *Bretonne Pie Noir*, from direct sales of processed dairy products or meat to added value for tourism and maintaining the landscape. To develop direct sales, which, for most of the dairy oriented farmers, was a core element of their systems, they needed to produce a wide range of products. To this end, they combined traditional products that are typical of the geographical area (like butter) with other products, by borrowing knowledge and cheese making know how (recipes from other regions). The customers are also different. They buy the products directly on the farm, at markets, through AMAP, or in organic food stores. They may also eat *Bretonne Pie Noir* products in restaurants. As Brittany is not a region where cheese is traditionally consumed, farmers mentioned that some consumers needed to learn to eat cheese. We believe it would be interesting to explore the point of views of “eaters” in more depth, as well as the interactions between farmers and consumers during the actual sales transaction. As Stassart and Claes (2010) pointed out, the consumer is often the missing link in agro-ecological studies, and we believe that the link between farming systems and consumer practices is too rarely taken into consideration.

- The diversity of activities on the farm or the multi-activity of the farmers

Finally, for some farmers, the diversity of activities is a way to create a more flexible system (linking *Bretonne Pie Noir* milk or meat production with another activity (breeding another species, having another agricultural activity like growing vegetables, or having another part time job with no link with agriculture)).

In conclusion, the *Bretonne Pie Noir* systems developed as the farmers explored the different types of diversity reviewed here. The breed’s qualities encouraged the design of those kinds of systems. Our results clearly show that farmers specifically look for different types of animals; some would even like to have a range of different animals in their own herd (see above). From the point of view of the sustainability of such systems, we can ask if, from a phenotypical point of view, diversity among the animal population is maintained through the diversity of individual practices.

This study has also underlined the importance of the social dimension of the agro-ecological thinking, like Stassart et al. 2012, who suggested adding a frame with social dimensions to the five initial dimensions of agro-ecology.

Finally this study invited to consider the concrete practices of farmers and other stakeholders who are developing or have developed systems that could feed the agro-ecological thinking.

²⁰² Even if a small number of farmers choose not to follow the plan, mostly because they do not use AI and sometimes also because they are looking for particular types of animals (e.g. in terms of color).

Acknowledgements

This project was part of the project “Organismes et Organisations Localement Adaptés” (O2LA) funded by the French Agency for Research (project ANR- 09-STRA-09).

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